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DATE: Friday, March 05, 2004

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		DB=USPT,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR	
☐	L2	(short near2 (pulse$ or packet$ or frame$)) same (time near3 hopp$3)	9
☐	L1	(short near2 (pulse$ or packet$ or frame$)) same (time near3 hpp$3)	0

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L2: Entry 2 of 9 File: USPT Dec 30, 2003

DOCUMENT-IDENTIFIER: US 6671310 B1
TITLE: Method and apparatus for positioning pulses over time by applying time-hopping codes having pre-defined characteristics

Brief Summary Text (15):
One known coding technique for an impulse radio is disclosed by Barrett in U.S. Pat. No. 5,610,907, entitled "Ultrafast Time-hopping CDMA-RF Communications: Code-As-Carrier, Multichannel Operation, High data Rate Operation and Data Rate on Demand." According to the disclosed techniques, two levels of coding are used: major orthogonal codes are applied to provide multiple channels, and forward error correction (FEC) codes are applied to information data before transmission. The disclosed system relies on dividing time into repetitive super-frames, frames and sub-frames. As disclosed, a super-frame corresponds to a time interval of about 1 millisecond, representing one repetition of a code pattern, where as a frame is defined as a time interval of about 1 microsecond divided according to a code length. A sub-frame corresponds to a short time interval of about 1 nano second during which a pulse is time positioned.

L2: Entry 3 of 9 File: USPT Oct 21, 2003

DOCUMENT-IDENTIFIER: US 6636567 B1
TITLE: Method of specifying non-allowable pulse characteristics

Brief Summary Text (6):
Multiple access impulse radio systems are radically different from conventional Code Division Multiple Access (CDMA), Time Division Multiple Access (TDMA) and Frequency Division Multiple Access (FDMA) systems. Unlike such systems, which use continuous sinusoidal waveforms for transmitting information, a conventional impulse radio transmitter emits a low power electromagnetic train of short pulses, which are shaped to approach a Gaussian monocycle. As a result, the impulse radio transmitter uses very little power to generate noise-like communication signals for use in multiple-access communications, radar and positioning applications, among other things. In the multi-access communication applications, the impulse radio systems depend, in part, on processing gain to achieve rejection of unwanted signals. Because of the extremely high achievable processing gains, the impulse radio systems are relatively immune to unwanted signals and interference, which limit the performance of systems that use continuous sinusoidal waveforms. The high processing gains of the impulse radio systems also provide much higher dynamic ranges than those commonly achieved by the processing gains of other known spread-spectrum systems. Impulse radio communication systems transmit and receive the pulses at precisely controlled time intervals, in accordance with a time-hopping code. As such, the time-hopping code defines a communication channel that can be considered as a unidirectional data path for communicating information at high speed. In order to communicate the information over such channels, typical impulse radio transmitters use position modulation, which is a form of time modulation, to position the pulses in time, based on instantaneous samples of a modulating information signal. The modulating information signal may for example be a multi-state information signal, such as a binary signal. Under this arrangement, a modulator varies relative positions of a plurality of pulses on a pulse-by-pulse basis, in accordance with the modulating information signal and a specific time-hopping code that defines the communication channel.

Brief Summary Text (14):
One known coding technique for an impulse radio is disclosed by Barrett in U.S. Pat. No. 5,610,907, entitled "Ultrafast Time Hopping CDMA-RF Communications: Code-As-Carrier, Multichannel Operation, High data Rate Operation and Data Rate on Demand." According to the disclosed techniques, two levels of coding are used: major orthogonal codes are applied to provide multiple channels, and forward error correction (FEC) codes are applied to information data before transmission. The disclosed system relies on dividing time into repetitive super-frames, frames and sub-frames. As disclosed, a super-frame corresponds to a time interval of about 1 millisecond, representing one repetition of a code pattern, where as a frame is defined as a time interval of about 1 microsecond divided according to a code length. A sub-frame corresponds to a short time interval of about 1 nano second during which a pulse is time positioned.

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L2: Entry 6 of 9 File: USPT Dec 12, 2000

DOCUMENT-IDENTIFIER: US 6160802 A
TITLE: Ultrafast time hopping CDMA and TDMA RF and optical communications: code-as-carrier, multichannel operation, high data rate operation and data rate on demand

Abstract Text (1):
Ultrashort pulse time hopping code-division-multiple-access (CDMA) and time-division-multiple-access (TDMA) RF IR and optical communications systems in the time-frequency domain comprises a transmitter including a short duration pulse/packet generator for generating a short duration pulse/packet in the femtosecond to microsecond range and a controller for controlling the generator, code means connected to the controller for varying the time position of each short pulse/packet in frames of pulses/packets in orthogonal superframes of ultrafast time hopping code and time division multiple access format, precise oscillator-clock for controlling such timing, encoding modems for transforming intelligence into pulse/packet position modulation form, antenna/amplifier system. Preferably, the codes are orthogonal codes with the temporal coding of the sequence of ultrafast pulses/packets constituting the carrier for transmission by the antenna system.

Brief Summary Text (6):
Briefly, the above features are achieved in an RF ultrafast time hopping CDMA and TDMA wireless communications system, which uses individual pulses and packets in a sequence of such pulses or packets, those individual pulses/packets being so short in duration (e.g., in the picosecond and nanosecond range) that the individual pulse signal energy is spread over very many frequencies simultaneously or instantaneously (instead of sequentially) with respect to a slow sampling system. A time hopping sequential code is also used to position these pulses/packets precisely in sequence providing optimum use of time-frequency space and also providing noninterfering transmission channels due to the orthogonality of the coding schemes used. The ultrashort nature of the individual pulses/packets used also permits the time duration of a frame to be divided into very many microintervals of time in which the signal could occur. This division into very many microintervals in a frame permits the availability of many possible coding schemes as well as many noninterfering transmission channels. Thus the ultrashort nature of the individual pulses, together with orthogonal coding schemes, permits the highest multichannel or aggregate data rates of any wireless communications system.

Detailed Description Text (86):
b) code means connected to the controller for varying the time position of each short pulse/packet in frames of pulses/packets in orthogonal superframes of ultrafast time hopping code division or time division multiple access format,

CLAIMS:

1. An ultrashort pulse time hopping code-division-multiple-access (CDMA) or time-division-multiple-access (TDMA) optical communications system in the time frequency domain, comprising:

transmitter means, said transmitter means including:

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a) means for generating a short duration pulse or packet in the femitosecond to microsecond range and means for controlling said means for generating,

b) coding means connected to said means for controlling for varying the time position of each said short duration pulse or packet in frames of pulses or packets in orthogonal superframes of ultrafast time hopping code and time division multiple access format,

c) precise oscillator-clock means for controlling such timing,

d) encoding modems for transforming information, voice and data signals into pulse position modulation form,

e) antenna means connected to said means for generating for receiving and broadcasting said short duration pulse or packet as a coded broadcast signal,

receiver means, said receiver means including:

a) antenna means for receiving said coded broadcast signal, and

b) homodyne or heterodyne receiver means for receiving and decoding said coded broadcast signal.

10. A transmitter for ultrashort pulse time hopping code-division-multiple-access (CDMA) and time-divisional-multiple-access (TDMA) optical communications system in the time frequency domain, comprising:

a) a short duration pulse or packet generator means for generating a short duration pulse or packet in the picosecond through nano-second to microsecond range and means for controlling said short duration pulse or packet generator,

b) a coding unit connected to said means for controlling for varying the time position of each said short duration pulse or packet in frames of pulses or packets in orthogonal superframes of ultrafast time hopping code and time division multiple access format,

c) a precise oscillator-clock for controlling such timing,

d) encoding modems for transforming information, voice and data signals into pulse position modulation form, and

e) an antenna connected to said short duration pulse or packet generator for receiving and broadcasting said short duration pulse or packet as a coded broadcast signal.

11. A transmitter for an ultrashort pulse time hopping code-division-multiple-access (CDMA) or time-division-multiple-access (TDMA) communications system in the time frequency domain, said transmitter comprising:

a generator for generating a short duration pulse or packet in the femitosecond to microsecond range and means for controlling said generator,

coding system connected to said means for varying the time position of each said short duration pulse or packet in frames of pulses or packets in orthogonal superframes of ultrafast time hopping code and time division multiple access format,

encoding modem means for transforming information, voice and data signals into pulse position modulation form and form a short pulse or packet coded broadcast

signal, and

an antenna connected to said short duration pulse or packet generator for receiving and broadcasting said broadcast signal.